

PUBLIC ABSTRACT

The Mississippian Leadville Limestone Exploration Play, Utah and Colorado – Exploration Techniques and Studies for Independents

Point of Contact: Thomas C. Chidsey
Sponsoring Organization: Utah Geological Survey
P.O. Box 146100
Salt Lake City, Utah 84114-6100
Ph.: 801/537-3364/Fax: 801/537-3400/E-mail: tomchidsey@utah.gov

Over 53 million barrels of oil has been produced from the 350-million year old (Mississippian) Leadville Limestone in six fields in the northern Paradox Basin region of Utah and Colorado. All of these fields are currently operated by small, independent producers and only independent companies explore for Leadville oil targets in the region, 85 percent of which is under the stewardship of the Federal government. This environmentally sensitive, 7,500-square-mile area is relatively un-explored with only about 100 exploratory wells that penetrated the Leadville (less than one well per township), and thus the potential for new discoveries remains great.

Oil is produced from the Leadville Limestone in traps formed by both folds (anticlines) and faults. The Leadville was deposited in a warm, shallow sea. Oil accumulated in reef-like buildups of limestone that developed on older fault-related topographic high areas.

The overall **objectives** of this proposed study are to: (1) develop and demonstrate techniques and exploration methods never tried on the Leadville Limestone, (2) provide maps that can be used to target areas for exploration that show the ancient environments of the Leadville, possible oil migration paths based on well pressures, and types of oil, (3) increase oil production from new and old fields by describing in detail the characteristics of the Leadville Limestone from Lisbon field (the largest producer of Leadville oil), (4) reduce exploration costs and drilling risk especially in environmentally sensitive areas, and (5) add new oil discoveries and reserves.

The project will be conducted over three phases, each with specific objectives and separated by continue-stop **decision points** based results to date. The objectives of **Phase 1** will be to conduct a case study of the Leadville Limestone at Lisbon field in order understand the rock characteristics so they can be applied regionally. The objectives of **Phase 2** will be to conduct a low-cost field, environmentally sensitive demonstration of new exploration technologies such as surface geochemical surveys of the soil, using a variety of new techniques, to detect where oil or gas may have leaked to the surface from Leadville accumulations at depth. The objectives of **Phase 3** will be to: (1) determine regional environments that the Leadville was deposited in by evaluating rock cores from wells, Leadville surface outcrops, and modern analogs such as the Bahamas or Florida Bay; (2) identify potential oil-prone areas based on shows (using low-cost microscopic fluorescence of oil in rock samples from wells); and (3) target areas for Leadville exploration.

These objectives are designed to assist the independent producers and explorers who have limited financial and manpower resources. All project maps, studies, and results will be publicly available in digital or hard copy format and presented to the petroleum industry through a proven technology transfer plan.

TECHNICAL ABSTRACT

The Mississippian Leadville Limestone Exploration Play, Utah and Colorado – Exploration Techniques and Studies for Independents

Point of Contact: Thomas C. Chidsey
Sponsoring Organization: Utah Geological Survey
P.O. Box 146100

Salt Lake City, Utah 84114-6100

Ph.: 801/537-3364/Fax: 801/537-3400/E-mail: tomchidsey@utah.gov

Over 53 million barrels of oil has been produced from the Mississippian Leadville Limestone in six fields in the northern Paradox Basin of Utah and Colorado. All of these fields are currently operated by independent producers and only independent companies explore for Leadville oil targets in the region, 85 percent of which is under the stewardship of the Federal government. This environmentally sensitive, 7,500-square-mile area is relatively un-explored with only about 100 exploratory wells penetrating the Leadville (less than one well per township), and thus the potential for new discoveries remains great.

Oil is produced from the Leadville Limestone in structural traps with closure on both anticlines and faults. The Leadville is a shallow, open marine, carbonate shelf deposit. Crinoid banks (primary reservoir facies) or mounds accumulated in shallow-water environments on upthrown fault blocks or other paleotopographic highs.

The overall **objectives** of this proposed study are to: (1) develop and demonstrate techniques and exploration methods never tried on the Leadville Limestone, (2) provide the facies, hydrodynamic pressure regime, and oil show quality maps that will be used to target areas for exploration, (3) increase deliverability from new and old Leadville fields through detailed reservoir characterization, (4) reduce exploration costs and risk especially in environmentally sensitive areas, and (5) add new oil discoveries and reserves.

The project will be conducted over three phases, each with specific objectives and separated by continue-stop **decision points** based results to date. The objectives of **Phase 1** will be to conduct a case study of the Leadville reservoir at Lisbon field (the largest Leadville producer) in order understand the reservoir characteristics and facies that can be applied regionally. The objectives of **Phase 2** will be to conduct a low-cost field demonstration of new exploration technologies to identify potential Leadville oil migration directions (evaluating the middle Paleozoic hydrodynamic pressure regime) and surface geochemical anomalies (microbial, soil, gas, iodine, and trace elements) especially in environmentally sensitive areas. The objectives of **Phase 3** will be to determine regional facies (evaluating cores, geophysical well logs, outcrop and modern analogs), identify potential oil-prone areas based on shows (using low-cost epi-fluorescence techniques), and target areas for Leadville exploration.

These objectives are designed to assist the independent producers and explorers who have limited financial and manpower resources. All project maps, studies, and results will be publicly available in digital or hard copy format and presented to the petroleum industry through a proven technology transfer plan.